The Wreck of the "Deutschland."

BY CARL DIENSTBACH.

Every one must feel a pang of regret that the first air liner, "Deutschland," should have been wrecked in a storm. The fine maiden voyage of this vessel had not only driven home the charm of atmospheric travel more than ever before, but it offered a chance for a sky trip to anyone for a comparatively moderate price. Mr. Hawley, of the Aero Club of America, once figured that an ordinary balloon ascension always cost him $132; namely, $32 for gas, $35 for a pilot, $15 for helpers, $6 minor expenses, $10 expressage, $10 for meals, $5 after landing, $3 for wagon, $3 for "tips," $10 for pasting ripping panel. Hence the fares of the "Deutschland" ranging from $25 to $50 were very moderate. The "Deutschland" trip was the first instance of modern wholesale passenger carrying in the air. Because of her capacity she could offer greater luxury and comfort at a comparatively low figure. The "Deutschland's" hugeness added to the charms of aerial motoring all the peace and comfort of a spherical balloon. At last year's Gordon Bennett balloon race in Zurich, a medium-sized Parseval airship was inflated in the open, with the "sphericals," and circled in the air while they got under way. The few invited passengers on board were enthusiastic over the evolution, but complained that the violent vibration, their closeness and consequent exposure to the grime and noise of machinery, had marred their pleasure. In the "Deutschland" the large scale and "decentralization of the load" insured perfect comfort and especially absence of vibration in the passenger cabin.

This fine ship was lost through over-confidence, and a certain amount of negligence, a humanly excusable consequence of the enthusiasm engendered by the first success. Contrary to newspaper comment, this disaster had hardly anything in common with previous fatal accidents to Zeppelin ships. In one way it is quite unique and "paradoxical." It proves that the Zeppelin rigid construction is safer than the non rigi in certain emergency landings. What would have happened to a Parseval under the same conditions? The car, with its concentrated heavy weight, would surely have crashed through the trees right to the ground. The envelope would have been torn into shreds and complete destruction and loss of life would have resulted. The "Deutschland," with its immense rigid length and the cars directly under the hull, was caught in the trees like a cushion. As far as personal safety is concerned a rigid airship seems to behave rather like an aeroplane. The craft breaks, but the passenger usually escapes.

All the real blame may be placed at the door of the meteorological service. It seems hard to believe that nothing was known beforehand of a severe storm that was to sweep the country within the brief space of two hours. There is also no excuse for the failure to provide wireless apparatus on the ship to warn the officers of this peril. A wireless receiver adds practically no weight to the equipment of any aircraft. It is available to the smallest spherical or aeroplane.

Disasters at sea were greatly reduced when early in the nineteenth century the "laws of storms" were at last comprehended. How much more important should it be to an aircraft, to know exactly the position and the shifting or a storm's center! To cap this, there seems to have been a faulty, near-sighted navigator on board the "Deutschland." Precious hours were absolutely wasted while trying to stem the tide of the wind—considering the fact that the craft entered the struggle under a heavy handicap. This appears like madness. When the "Zeppelin II." was lost at Wellburg, the Zeppelin company rightly criticised the military officers for some obvious mistakes they had made. Now the company has laid itself open to criticism. Its experience with rigid airships naturally excelled that of the military authorities. New experience had to be paid for dearly. It has come to light that at least those in charge on the fatal trip lacked indispensable knowledge.

There was one thing fundamentally wrong with this trip, which is most obvious, but has been ignored: From the strictly nautical point of view the "Deutschland" could lift its full complement of twenty passengers only on exceptional occasions.

To make the ship pay, every ounce of available lift was, of course, pressed into service. There is no objection to this whatever, especially for short trips, (it has been done many times, even the "small" Z. I. once carried twenty-eight two hours long) *when the weather can be trusted.* But there is the fundamental difficulty with air navigation that each air craft is a "seagoing" craft. What would have been the history of steam navigation if Fulton's "Clermont" and its early progeny had been tried out at sea, near rocky shores in stormy weather? If the stormy development of the "Deutschland's" trip had been half way anticipated, the twenty passengers would have been reduced to five or six, the crew to nine, the fuel supply increased and the gas supply decreased. The crisis for the "Deutschland" came when with fuel exhausted it was carried helplessly to high altitudes by an ascending rush in the hurricane. The gas was lost by expansion, and the badly deflated overloaded rain-soaked ship would have dropped like a stone, if it had been a flabby, "pear shape" spherical, without ballast, in place of a long rigid parachuting structure. It should not be forgotten that in such a gale, Capt. von Siegsfeld was killed in a spherical balloon while landing in Holland.

With the "Deutschland" prepared as stated, it could, with running motors, have resisted the upward gust. The change of altitude would not have weakened its support because the gas would have had space to expand inside the hull, instead of escaping.

What should have been done with the unprepared ship was to have reached a place of shelter in the shortest possible time by going with the storm, but, like a skilled mariner, working steadily away from the center. As in marine navigation, all regard for the "course" must be abandoned in cases of danger.

Newspaper accounts that the craft was "unmanageable" (nobody knows what that word stands for), and especially that the pilot "did not dare to turn it around for fear of capsizing," are not only disproved by later Berlin reports of the passengers agreeing on the ship's excellent work against the elements until the power gave out, but the statement about turning contradicts itself. The course seems to have been fairly well maintained despite the storm. An intentional turn could have been made in so wide a circle that it would be unnoticeable. There would be some rocking and pitching in violent gusts, but the resistance of these is exactly the strong point of these monster Zeppelins. They have great weight and inertia and little surface in proportion.

Inertia resists the gusts, and surface, the *whole* surface, not merely the projected area, according to the modern frictional theory, helps them. Consequently the very smallest and lightest airships, the notorious American show dirigibles, are the most unstable of all. The stability of the Zeppelin in a wind that played havoc with sphericals at Frankfort and made it hard to keep one's hat on, must have been seen as the writer saw it, to be appreciated. It was not for nothing that a mere attendant of the aeronautical exposition answered the incredulous question of the writer: Will the Zeppelin ascend on such a day? "The Zeppelin does not care for the weather; the others (at the exposition) do." And there was also a reason why the French during the past two years did nothing with their small dirigibles. Fortunately, the Zeppelin movement is now too deeply rooted in stolid discerning Germany to suffer too much even by the heavy financial loss of this wreck. If over-confidence was destroyed, all the better.

And if the new "Deutschland" will be made large enough to provide space for the gas to expand even with twenty passengers—only an increase in first cost but none in running expenses, the result will be still better. As it was the passengers owed their lives to that increase in size which rendered it possible to carry three motors in place of two.

The Government's Money Laundry.

BY THOMAS P. SANNWALD.

Very few people realize the vast amount of money that is spent by the government each year for the manufacture of our paper currency and the maintenance of its circulation. It actually costs "Uncle Sam" $13.50 per thousand notes (regardless of denominations) to manufacture and put them into circulation. This is equal to an annual interest of almost 1¼ per cent on the $1 notes, which have an average life of only fourteen months. The life of small notes is very much shorter than that of the larger denominations, because of the greater amount of handling which they receive, therefore, the greater part of the expense of our paper currency circulation is incurred with the smaller denominations. This is better understood when we learn that the $1, $2 and $5 notes—excluding national bank currency—compose about 43¾ per cent of the number of notes in circulation. The larger denominations are fit for circulation much longer after they are first issued than the smaller ones, hence do not have to be redeemed so soon thereafter.

A very large portion of the notes which come back to the Treasury Department for redemption are not worn out, but are merely soiled from rough usage.

As a result of the clamor for economy in public expenditures, and also for clean paper currency, the Director of the Bureau of Engraving and Printing, Mr. Joseph E. Ralph, conceived the idea of putting these soiled notes through a laundering process and then back into circulation. The more he studied the scheme the more feasible it appeared to him. He submitted his plan to the Secretary of the Treasury, and he (the Secretary) appointed a committee composed of Mr. C. S. Pearce of the Treasurer's office, chairman; Mr. Burgess Smith of the Bureau of Engraving and Printing, chemist; Mr. George Leet of the Secretary's office; Mr. C. C. Pusey, Assistant Treasurer at Baltimore, and Mr. L. R. Acton, a paper expert of Washington.

These men have been experimenting with the laundering process for about seven months, and, as a result of these experiments, have proved beyond a reasonable doubt the feasibility of the scheme.

The process of washing the money is very simple, being almost identical to that used by the steam laundries all over the country. The chairman of the committee says: "The scheme of laundering paper money is here to stay, but the exact method of washing it has not yet been decided upon." The committee are experimenting with two or three styles of tubs. One of the most feasible plans is to put the notes into a wire contrivance, which holds them in such manner as to prevent any friction whatever, and also prevents them from piling together. This contrivance consists of a number of wire trays with a single layer of notes in each, and then stacked together and placed inside of a cylindrical tub filled with suds made with a soap especially prepared for this work by Mr. Burgess Smith, chemist, who has charge of the practical part of it. The soap is composed principally of potash and some high grade oils. Mr. Smith is now trying to manufacture a soap which will cleanse the money and at the same time bleach it.

After the trays of money have been placed in the suds, which have been heated to a temperature of 130 deg. to 140 deg. F., the tub is closed and started to revolving. A greater temperature than 140 deg. F. has proved to be injurious to the money. This process is kept going for ten to fifteen minutes, during which time the dirt has been removed from the notes. They are then taken out and rinsed the same way in clear water for about five minutes to remove all the suds. Next it is put into a germicide bath of the nature of formaldehyde, thereby killing all germs which may be lurking around on it. It is taken from this and bleached and partially dried. The next step is to put it through the sizing tub, or vat as it may be called. This vat contains a 10 per cent solution of glue with a little alum in it. There are a number of small endless belts, which pass over rollers at the top of either end of the vat and under one in the solution. The money is fed in between these belts at one end of the vat, and they carry it down through the solution and drop it out at the other end. It is then taken to the ironing machine.

Here it is placed in stacks containing about forty notes each, with a piece of Fuller (or press) board separating the notes from each other. This Fuller board is a thin flexible substance, resembling a thin piece of sole leather. These stacks are taken one at a time and fed through between two heavy steel rollers, which are held together with a 20-ton pressure. Each stack of notes is put through two of these machines, which completes the ironing and gives them a glossy, new appearance.

The laundry is now washed and ironed, and the only thing left to be done is to place it in the drying room, for the purpose of getting rid of every particle of moisture that it may contain. It pays to launder money for the same reason that it pays to have your linen laundered instead of throwing it away and buying a new supply.

The yellow ink used on the gold certificates is of such a character that the potash dissolves it, and it is washed out, hence they cannot yet be laundered. So it is with the signatures of the bank officers on the national bank notes. The committee hope eventually to overcome this difficulty. As it is at present, they can only launder silver certificates and Treasury notes, but these compose a very large percentage of our paper money.

In my calculations I shall exclude national bank notes, as they are in a class of paper currency by themselves, and for the reason stated cannot yet be laundered. During the year 1909, there were 187,784,000 $1, $2 and $5 notes issued, and in the same period of time there were 177,412,809 notes of the same denominations destroyed. At the close of the year 1909 there were 222,365,692 notes of these three denominations still in circulation. The cost to the government for manufacturing and issuing these 187,784,000 notes was $2,535,084. The cost of destroying the 177,412,809 notes was $390,308.18, making a grand total of $2,925,392.18 for maintaining the circulation of notes of only three denominations for one year.

It is estimated that it will not cost more than one-tenth of one cent per note to launder them. It is claimed that laundering the notes will add at least eight months or 56 per cent to the life of them, thereby diminishing the annual redemptions by 56 per cent. The redeeming and issuing of the 177,412,809 notes in 1909 cost the government $2,787,155.23. With the new process 56 per cent of this, or $1,560,806.93 less $298,053.52, the cost of laundering and reissuing of the 56 per cent of the redemptions for 1909, would be saved. This would leave a net saving of $1,262,753.41 in one year on the circulation of $1, $2, and $5 notes only (national bank notes excluded).

Our New Currency Machines.

BY THOMAS CANNAWAY.

The Director of the Bureau of Engraving and Printing, Mr. J. E. Ralph, is having some machinery installed in his department which is going to save the government many thousands of dollars annually on the cost of the preparation of our paper currency alone.

It has not, until very recently, been the custom to print the United States seal and the Treasury numbers on gold certificates, silver certificates, and Treasury notes, at the Bureau of Engraving and Printing. Without these, they are worthless. It was the custom, however, to take the sheets, which contain four notes each, and pass them, one at a time, through a trimming machine which trimmed them on two sides only and then put them in packages of one thousand sheets each and to deliver them to the Treasurer in the Treasury Building. Here they were fed through presses, similar to ordinary job printing presses, which printed the United States seal and Treasury numbers on them; then they were put into a separating machine, which trimmed the ends of the sheets and cut apart the four notes.

FORTY NEW TRIMMING MACHINES.

The forty new trimming machines which are now being installed at the Bureau are so constructed that they trim all four sides of the sheet at once. The knife is about one inch wide and is in the shape of a rectangular frame, and is arranged so that the operator slips the sheet under it onto the die with her right hand, reaches with her left hand over one side of the knife into the rectangle and places the sheet in the proper position, then while she still holds it, with a slight pressure of her foot, the machine working automatically, makes one stroke, and the four sides are trimmed. The operator immediately releases her hold, and the sheet is carried into a receptacle for receiving it. This machine is run by electricity, and occupies about one-third of the space the old ones did. One girl will trim an average of 7,000 sheets on four sides in seven hours, while with the old machines it required two girls to trim 8,000 sheets on two sides in the same length of time.

THE NEW COMBINATION MACHINES.

The money is carried from these trimmers to the new combination machine, which is a marvelous piece of mechanism. It is very compact, being only about one-half as large as it seems that it would have to be to contain the many distinct features which it does. It is only about three feet wide, four feet long, and four feet high. The trimmed sheets of four notes each are fed endwise into this machine at the rate of about 4,000 per hour. It prints the United States seal and the Treasury numbers on each note, and then they are as "good as gold." The Treasury numbers must run in numerical order, hence they are different on each note. Example: Suppose they were beginning with No. 1, the notes on the first sheet would be numbered 1, 2, 3, 4. Next the machine separates them, and moves them out endwise to one side on four small planes just large enough to hold one note each. These planes are placed side by side and slightly elevated, so that one side of each extends just a little above the lower edge of the one next to it. There are two grooves running crosswise of the four planes. As soon as the four notes are carried onto these four planes, there is a little rake with two tines running in the two grooves which pulls note No. 1 off its plane and drops it on top of No. 3, then notes No. 4 and No. 3 are both pulled off onto No. 2, likewise the three are dropped onto No. 1; the four are then dropped into a compartment much lower than plane No. 1. Here they are held for others to be stacked with them. The next four notes are numbered 5, 6, 7, and 8, and are stacked in the same way and automatically dropped on top of the first four, and so on until this stack contains 100 notes. When this process has been repeated the twenty-fifth time, the stack, then containing 100 notes, is automatically released and carried under the four planes back to the front of the machine and dropped. Here they receive the first human touch since the original sheet was fed in at the top.

EXAMINATIONS OF THE NOTES.

The first inspector receiving them examines the first four and the last four notes to see that the numbers started and ended correctly. By the time she does this (and she must do it quickly) there is another 100 ready for her. She then passes them on to another inspector, who examines every note to see that the seal and numbers are properly placed on each. Each inspector after having examined the 100 notes places a paper band around them and puts her name on it, and she is held responsible for the correctness of that particular package until it has been received and inspected in the Treasurer's office. It requires seven girls to examine the work of one machine.

Each machine is placed in a wire cage to itself, and no one except the employees belonging to it are permitted in that cage. Off a little way from this cage is a wire screen, beyond which the public is not permitted to go. These employees are charged with all the money which goes into their cage, and are not allowed to leave it without a pass.

AUTOMATIC FEEDER.

Soon after the installation of these machines is completed (which will be some time in July, 1910), Mr. Ralph expects to have an automatic feeder, which is now being perfected, placed on each of them. This will increase their capacity about 1,000 sheets per hour, besides saving about $30 or $40 a day in salaries of feeders. They will then have a capacity of 5,000 sheets per hour, making a total of about 140,000 notes per day.

There will be sixteen of these machines, fifteen for constant use and one for an emergency. They will take the place of nineteen of the old-style presses, requiring a pressman and a feeder to operate each, and twenty-six of the old-style separating machines, requiring three persons each to operate them, besides a large corps of messengers to handle the money. This makes a total of 114 employees besides the messengers, and the money is yet to be inspected. The new machines, equipped with the automatic feeders, will do this same work and only require one man with each machine, besides a small corps of messengers.

The saving in the expense of preparing our paper currency alone will be $180,000 annually.

This change in the system of finishing the paper money greatly increases the responsibility upon the Director of the Bureau, as heretofore none of it was completed there. But Mr. Ralph seems to willingly bear this additional burden, and at the same time is well pleased with the results of his reformatory efforts. The whole country will feel the effects of such efforts, and should congratulate Mr. Ralph for his great achievement.

The 1910 Glidden Tour.

The annual tour of the American Automobile Association has been run under various conditions since its inauguration, but in recent years it has developed into a trade means of arousing an interest in the automobile. It is natural, therefore, that the route chosen should lie through sections of the country that have not been developed as markets, and it follows that these are the sections that will be benefited by the good roads propaganda, the spreading of which is the secondary object of the tours.

The 1910 tour covered a distance of 2,851 miles, and starting from Cincinnati, O., led through Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Texas, Oklahoma, Kansas, Missouri, Nebraska, Iowa, and Illinois to Chicago, where it disbanded. The Glidden trophy, from which the tour takes its name, was as usual competed for by touring cars, while the Chicago trophy was offered by the runabout or miniature tonneau car making the lowest score. Competition was limited to cars of strictly stock models, and in order to assure this, the makers were required to file sworn statements of the types, dimensions, equipment, etc., of their product. The competing cars were delivered to a technical committee some days before the start of the tour, and were checked against these records. This is but one example of the strictness of the rules, which were intended to assure an exact knowledge of any defects or derangements that might appear.

The cars were subject to penalization according to a point system that took mechanical failures into consideration, as well as arrival at a control at any other than a specified time. All possible accidents to the mechanism or appurtenances of a car were listed at the beginning of the tour, a penalty being fixed for each, and these penalties varied from one point for a leaky oil or water connection to 500 points for a break in the steering apparatus or of a frame side-member. Carbureter adjustments, spark-plug changes, and attention to the lubrication of the mechanism were permitted during one-half hour at the night stops, while brake adjustments were allowed at only two points on the route. It was assumed that beyond these a car should require no attention, and all other work was therefore penalized. Each car carried an official observer, and in addition to this, the bonnet, gear case, differential housing, and other parts of the mechanism were sealed. As the tool boxes and bags also bore seals, the officials were reasonably sure of being informed of any work required by the mechanism.

The running time between controls was set at 20 miles per hour for the Glidden trophy cars, and 18 miles for those competing for the Chicago trophy. The time when a car left a control therefore established its time of arrival at the following control, and any time lost on the road was charged for at the rate of one point per minute. The only exception to this was in the case of tire trouble, which was not charged for if the engine was kept running while the repair or replacement was being made. In view of the importance of the tire problem to the automobile industry, it seems unfortunate that advantage is not taken of the opportunity offered by such a tour as this for a comparison between the various makes of tires on the market. While it would perhaps be unfair to penalize a car for the failure of its tires, some consideration should be given to the subject, and whether or not a certain make of car is easy on its tires is a point of interest to the purchaser.

The list of entries was striking, for nearly one-half of the makers represented are newcomers to the industry, and most of the cars were of medium price and horse-power. In former years, the entry list has included many makes of high-priced and high-powered cars, but in the 1910 tour there were but two cars listing at over $3,000. One explanation of this is in the route chosen, which runs through a section of the country that is not a logical market for cars of high price. The roads traversed undoubtedly exercised an influence on the manufacturers, who may have considered the advantage of a light car in sand and mud. As it turned out, however, the Glidden trophy was won by the 6-cylinder Premier, which headed the list for price, power, and weight.

Twenty-seven cars started on the tour of the following makes: Carter-car, Chalmers, Cino, Cole, Detroit, Lexington, Maxwell, Ohio, Oldsmobile, Perry, Pierce-Arrow, Premier, and Westcott. There were accompanying the cars carrying the officials and correspondents. Two Cadillac cars entered by the Northwestern Military Academy attracted attention, as they were equipped with rapid-firing guns and designed for scouting work. The cars were manned by students from the academy, in command of one of their officers, and the tour gave the detachment practical experience in the military possibilities of the automobile. The equipment of these cars included tents and a camping outfit, and the nights were spent under canvas.

The average day's run was 158 miles, the longest being 242 miles and the shortest 60. In view of the road conditions encountered, this mileage is extraordinary, and the ability of some, if not all, of the cars to keep to the schedule is a convincing manifestation of the excellence of the modern automobile.

In the tours of previous years the penalties imposed were chiefly for engine troubles, and it is of departure to note that this year, in spite of the severity of the conditions, engine failures and tire troubles were rare. This not only indicates an approach to perfection in design and construction, but very great improvement in carburetors, spark plugs, ignition apparatus, and other accessories. On the other hand, failures of all parts of the running gear were so frequent that the manufacturers cannot but be impressed with the imperative necessity for a deeper study into these parts. An engine failure will do no more than delay the progress of a car, but a mishap to the running gear endangers the lives of the occupants, and should be guarded against at all cost.

The most serious of these troubles, so far as the safety of the user of a car is concerned, lies in the steering gear, and it is disquieting to note the number of penalties that were imposed for the failure of this part. Broken steering knuckles and steering-gear arms were by no means infrequent, and as in many cases these parts are purchased from concerns specializing in their manufacture, it is to be hoped that the lessons of the tour will be studied and applied. Steering gear troubles, as well as broken and sprung axles, the loosening of wheels, the breaking of springs, and corresponding difficulties, led to the concession of dissatisfaction with the selection of the route, but from the point of view of the automobile user, and for the improvement in construction that is bound to result, the selection was most wise.

The difference between the 1910 tour and the tours of previous years is shown by the fact that when the cars drew into Chicago on the sixteenth and last day, all were penalized more or less severely, and sixteen had dropped out. The awarding of the trophies was not based on these scores only, however, for the cars were required to pass through a final technical examination that in many respects was one of the most interesting features of the contest. The first step in this was the testing of the brakes, the basis of which was the supposed ability of either the foot or the hand brakes to stop the car within fifty feet, the car running at 18 or 20 miles an hour, according to its class, when the application was made. The car approached a mark in the road a, the running speed, and if it passed a second mark 50 feet in advance after the brake was applied, it was penalized at the rate of one point per foot.

As a test for the clutch, the front wheels were held against an 8-inch curb, the engine speeded up, and the clutch applied. If the wheels climbed the curb, if the rear wheels were slipped, or if the engine was stalled, the clutch was considered to be in perfect condition. After these tests the cars were delivered to the technical committee for a searching examination into every detail. The eleven cars were penalized in this on 72 counts; 38 of these were for defects in the running gear, and but 8 for defects in the engine.

The final scores in the Glidden trophy division were as follows: Premier, 93; Chalmers, 116; Maxwell, 208; Premier, 806; Glide, 2,247; Cino, 2,414. In the Chicago trophy division the penalties were not so severe, which may be due to the lower rate of speed